

Sunday 12 September 2010

## Tri-Agency Weather Summary

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**\*\*The figures can be obtained from the PREDICT 1400 UTC weather discussion from 12 Sep. [see URL: [http://catalog.eol.ucar.edu/cgi-bin/predict/htmlwrap?file\\_url=/predict/report/weather/20100912/report.weather.201009121400.discussion.html](http://catalog.eol.ucar.edu/cgi-bin/predict/htmlwrap?file_url=/predict/report/weather/20100912/report.weather.201009121400.discussion.html)]**

### **Current Conditions/Review of Yesterday's Forecast:**

Big Picture: The large-scale flow conditions in the middle and upper troposphere across the CONUS, Gulf of Mexico, Caribbean Sea, and North Atlantic at 1415 UTC 12 Sep are summarized by the high-resolution water vapor winds (**image 1**) and the Atlantic scale IR image for 1052 UTC 12 Sep (**image 2**). The upper-level anticyclone over the southeast U.S. yesterday has retrograded to over the southern Plains by 1415 UTC (**image 1**). An upper-level trough is located over the eastern U.S. and western North Atlantic. On the southeast flank of the aforementioned anticyclone and attendant downstream trough, a northeast-to-southwest oriented axis of dilatation was in place stretching from near 35 N 70 W to near 20 N 90 W (**image 1**). East of this axis of dilatation, generally light upper-level winds exist over a broad region...particularly over and north of PGI44L, which is the focus of PREDICT over the next couple of days. Farther east...a large anticyclonic wave-breaking event is in progress over the central North Atlantic. The remnants of PGI39L near 35 N 48, have been given a 10% chance of development by NHC (**image 2**) likely in response to its brief organization in a weak shear region in the base of the foldover ridge...is about to be absorbed by the baroclinic cyclone just to its immediate west (**image 1**). TC Igor (PGI41L) and TD 12 (PGI43L) are both located south of the strong upper-level westerly flow associated with the positively-tilted trough stretching from 30 N 30 W to near 40 N 10 W. TC Igor is moving into a region of weaker deep-layer vertical wind shear in the base of the foldover ridge. The pouch locations that identify the rotating features described above are superimposed on a TPW image for 1200 UTC 12 Sep (**image 3**).

PGI44L: At 1200 UTC 12 Sep, PGI44L was located near 15.9 N and 69.8 W based upon an analysis of available satellite imagery and the ECMWF forecast pouch position (**image 4**). WV satellite imagery loops ending 1645 UTC 12 Sep show that PGI44L is associated with a large area (~500 x 300 km) of convective and stratiform precipitation that is mostly concentrated in the northern semicircle of the storm relative to the 1200 UTC 12 Sep estimated pouch location (15.9 N and 69.8 W). Small precipitation clusters (convective and stratiform) were also evident in the eastern and southern quadrants of the storm (not shown). Numerous overshooting convective tops, indicative of fairly widespread convection, were identified during the late morning by a CIMSS-PREDICT product designed to provide guidance to

pilots on the locations of potentially dangerous vigorous convective elements (not shown; see URL [http://cimss.ssec.wisc.edu/tropic2/predict/overshooting\\_tops/](http://cimss.ssec.wisc.edu/tropic2/predict/overshooting_tops/)).

Radar loops from San Juan, St. Maarten, and Martinique indicated the presence of widespread showers and thunderstorms, some with weak banded structures, over the northern semicircle of PGI44L (not shown). Clear indications of rotation in the radar imagery characteristic of a TD-level disturbance were not found. Clear indications of rotation in an ongoing G-V mission through PGI44L in the 925/850/700 hPa winds were also not found.

The “vitals” of PGI44L were identified from the CIMSS-PREDICT “invest” page, As of 2100 UTC 12 Sep, these vitals were as follows: the deep-layer shear was weak (5-10 kt), the developing storm was embedded in a region of very high maximum potential intensity (< 900 hPa) (**image 5**), the TPW values were high (>55 mm), the low-level vorticity/OW maximum was embedded in high TPW values, and the corridor of high SSTs (29-30 C) coincided with the track of the ECMWF forecast pouch from 0000 UTC 12 Sep (**image 6**). All the available environmental factors suggest that PGI44L should develop into a TC within 24-48 h, given the presence of an aircraft-indicated low-level vortex embedded in a very moist environment from yesterday and more widespread satellite- and radar-indicated convection today.

Similar to the previous two days, the character of the convection in PGI44L has varied diurnally and varied between the same times each day. Although a G-V research flight into PGI44L this morning failed to find a ground-relative closed low-level (925 hPa) circulation, a weak, tilted (toward the southwest) midlevel cyclonic circulation was identified. A comparison of the NHC infrared satellite imagery (rainbow curve) for 0915 UTC and 1645 UTC clearly shows that in pouch-relative coordinates that the area of most active deep convection shifted from the northeast to the southwest side of the convective region in PGI44L (**image 7** and **image 8**). Since the dropsonde data obtained on the G-V research flight this morning identified a weak midlevel (700-500 hPa) circulation on the southwestern side of the earlier convective envelope (reported by Chris Davis who was aboard the flight), our inference is that a new low-level circulation center could form by this evening in the vicinity of the developing midlevel center. Support for this inference is found from a comparison of the 12 h and 24 h layer-mean 925-850 hPa relative vorticity, TPW, and 250 hPa height forecasts from the ECMWF verifying 1200 UTC 12 Sep and 0000 UTC 13 Sep, respectively. The 12 h ECMWF forecast vorticity maximum in PGI44L is elongated to the northeast, analogous to the evolution of the satellite-indicated convection in PGI44L discussed above (not shown) while the vorticity maximum in the 24 h ECMW forecast (verifying 0000 UTC 13 Sep) is much more compact and suggestive of a growing disturbance (not shown).

Igor (PGI41L): The 1052 UTC NHC graphical weather outlook shows that TC Igor was a mature tropical cyclone...with 70 kt surface winds (**image 2**). Satellite depiction of Igor during the morning hours suggested that it was rapidly organizing

and intensifying, and the 1500 UTC 12 Sep NHC update and forecast reflected this change as follows:

#### FORECAST POSITIONS AND MAX WINDS

INITIAL	12/1500Z	17.7N	45.7W	90 KT
12HR VT	13/0000Z	17.8N	47.5W	105 KT
24HR VT	13/1200Z	18.0N	49.8W	110 KT
36HR VT	14/0000Z	18.4N	51.8W	115 KT
48HR VT	14/1200Z	19.0N	53.6W	115 KT
72HR VT	15/1200Z	20.7N	56.7W	125 KT
96HR VT	16/1200Z	22.6N	59.6W	125 KT
120HR VT	17/1200Z	24.5N	62.5W	125 KT

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TC Igor should continue to rapidly intensify...potentially at a faster rate than the NHC forecast would indicate...as it moves westward over the next few days into an environment with weak deep-layer vertical wind shear and warm SSTs. The 1500 UTC NHC track forecast shows that gradual recurvature should begin on Monday afternoon (**image 9**)...taking Igor well northeast of STX over the next week.

\*\*\*1715 UTC update...it appears that Igor has rapidly intensified into a (likely) Cat 4+ storm (**image 10**).

TD 12 (PGI43L): At 1200 UTC, PGI43L (now TD 12) was located just west of 20 W and was associated with well-organized convection on its west and north flank (**image 11**). It is expected that TD 12 will rapidly become a tropical cyclone within the next 48 hours (**image 2**) and subsequently recurve into midlatitudes.

#### Day 1 (Next 24 hours) Outlook:

PGI44L: The 700 hPa pouch analysis derived from the ECMWF forecast from 0000 UTC 12 Sep suggests that PGI44L will move generally west-northwestward and be situated near 16.3 N and 75.7 W at 1200 UTC 13 Sep (**image 4**). The magnitude of the 700 hPa relative vorticity and OW parameter are forecast to increase in the 36-h forecast period ending 1200 UTC 13 Sep (**image 4**). Synoptic reasoning based on environmental indicators and the observations discussed above still suggest that PGI44L could possibly intensify to TD/TS status by 1200 UTC 13 Sep. Ryan Torn's 36-h WRF ensemble forecast from 0000 UTC 12 Sep that verifies 1200 UTC 13 Sep shows a cluster of storms along a southwest-northeast oriented axis with the deeper storms to the southwest that is consistent with the above inference about the possible impact of new convection developing in PGI44L to the southwest (**image 12**). Note that the majority of the members in Torn's 36-h ensemble forecast produce a minimal TC by 1200 UTC 13 Sep.

Igor (PGI41L): Igor is progged to continue on a westward course by both the GFS and ECMWF, reaching 50 W by 1200 UTC 13 Sep (**image 13**; top panel EC only). The ensemble from Jonathon Vigh's page (**image 14**) show agreement with the GFS and ECMWF deterministic runs, and indicate gradual intensification...which is already falling well behind the current intensity of the storm (**image 10**).

TD 12 (PGI43L): Both the GFS and ECMWF prog TD 12 to move westward to near 25 W by 1200 UTC 13 Sep (**image 13**; top panel EC only)...with rapid intensification likely. The ensembles (**image 15**) are consistent with the movement...if perhaps slightly faster...with intensification to a weak-to-moderate tropical storm anticipated within the next 24 hours.

### **Day 2 (24-48 h) Outlook:**

PGI44L: The pouch analysis from the 0000 UTC 12 Sep ECMWF 60-h forecast verifying 1200 UTC 14 Sep indicates that PGI44L will be located near 17.5 N and 80.3 W (**image 4**). Approximately 55%, 70% and 70% of the 96 members of Ryan Torn's WRF ensemble produce sustained 35 kt winds (TC status) in the 30-h, 36-h, and 42-h forecasts verifying 0600, 1200, and 1800 UTC 13 Sep (**image 12**; 36-h shown only). Also of interest is the forecast bimodal intensification distribution that is evident by 1800 UTC 13 Sep with one cluster remaining below TC status and a second cluster showing vigorous TS status (**image 16**). Forecast position uncertainty in the 42 h forecast verifying 1800 UTC 13 Sep is distributed along a northeast-southwest axis. The deepest member storms are situated toward the southwestern end of the forecast location envelope, consistent with arguments advanced above pertaining to a possible southwestward shift in the PGI44L pouch. The ensemble WRF track is in better agreement with the consensus track of the ECMWF, GFS, and UKMET models and the track of the forecast pouch based on the operational ECMWF model from 0000 UTC 12 Sep. Factors that could inhibit the intensification of PGI44L to TC status during the 24-48 h include the interaction of northern half of the weak PGI44L circulation envelope with the Hispaniola landmass and the continuing absence of any low-level circulation center.

Igor (PGI41L): By 1200 UTC 14 Sep, Igor is progged by the ECMWF (**image 13**; bottom panel) to be near 53 W and showing signs of recurvature compared to 240-h earlier as a result of the approach of a midlatitude trough. The ensembles (**image 14**) are consistent with the deterministic ECMWF, showing recurvature beginning near 55 W in the 48-h forecast. Ignore the intensity forecast since it has already been proven irrelevant (compare **image x2** and **image x5**).

TD 12 (PGI43L): At 1200 UTC 14 Sep, TD 12 is progged to be located near 29 W as a mature tropical cyclone (**image 13**; bottom panel). Both the deterministic ECMWF and the ensembles (**image 15**) indicate that TD 12 will continue to intensify and will begin to recurve by 48-h in response to the upper-level trough located over the eastern North Atlantic.

**Extended Outlook:**

PGI44L: The ECMWF, GFS, and UKMET models all continue to move PGI44L westnorthwestward with varying intensities and propagation speeds. The ECMWF 120 h forecast verifying 0000 UTC 17 Sep brings PGI44L to near 20.5 N and 92.5 W (Bay of Campeche). The GFS 120 h forecast initiated at 0000 UTC 12 Sep brings PGI44L to near 17.5 N and 94.7 W while the 120-h UKMET forecast from 0000 12 Sep places PGI44L near 20.5 N and 91.0 W at 120 h (not shown). Only the ECMWF forecast from 0000 UTC 12 Sep intensifies PGI44L into a TC. Almost 90% of the 96 members of Ryan Torn's 96 member ensemble have PGI44L as a TC in the 72 h forecast verifying 0000 UTC 15 Sep (**image 17**). The SHIPS model slowly and steadily intensifies PGI44L into a major hurricane by 120 h under very favorable environmental conditions of low shear, high SSTs, and significant ocean heat content (not shown).

Igor (PGI41L): In the extended range, TC Igor is progged to recurve into midlatitudes...reaching 33 N 65 W in the 168-h GFS forecast (**image 18**; top panel; also shown by the ensembles in **image 14**). The ECMWF forecast verifying at the same time (**image 18**; bottom panel) indicates a less dramatic recurvature compared to the GFS. This difference is likely because of the more zonal straight westerly flow forecasted for midlatitudes in the ECMWF, particularly compared to the GFS. For interests here in STX, the ECMWF ensemble 108-h forecast shows generally good agreement in the position of Igor (**image 19**)...with the most southern members of the ensemble keeping Igor north of STX by the middle of this week.

TD 12 (PGI43L): All models indicate that TD 12 will intensify into a tropical cyclone and recurve into midlatitudes over the central North Atlantic in the long range (**image 15** and **image 18**). The 108-h ECMWF ensemble also indicates recurvature...with some uncertainty in the north/south position of TD 12 (**image 19**). The uncertainty in the position of TD 12 in the ensemble is likely related to the uncertain behavior of TD 12 during the impending trough interaction with the upper-level trough over the eastern North Atlantic.